

*Application
for
United States Patent*

To all whom it may concern:

*Be it known that, William C. Eungard,
has invented certain new and useful improvements in*

PANEL ASSEMBLY FOR DOCK SEAL OR SHELTER

of which the following is a description:

PANEL ASSEMBLY FOR DOCK SEAL OR SHELTER

FIELD OF THE INVENTION

[0001] The present invention relates generally to an apparatus and method for sheltering vehicles parked at loading docks. More particularly, the present invention relates to an apparatus and method for sheltering vehicles of varying widths and heights that are parked on or off -center at loading docks.

BACKGROUND OF THE INVENTION

[0002] In the loading and off-loading of vehicles such as a semi-trailer trucks, it can be beneficial to shelter or seal the area between the dock and trailer against the environment. For example, when a loading dock door is opened to gain access to a vehicle, there is potential for exchange of inside and outside air that contributes to energy loss. At other times, inclement weather may contribute to slush, snow, or ice being collected on the vehicle which may flow around the sides and over the top of the vehicle onto the dock area, creating a hazard for service personnel. A similar effect can occur while the truck is parked at a dock and waiting to be loaded or unloaded, when a rain, wind, or snow storm begins.

[0003] Typical dock shelter designs include a rigid frame and fabric curtains. Typical dock seal designs include a foam pad which is covered with a fabric exterior. Such designs can experience energy loss when mounted to a dock having inclined or declined driveways. For example, when a truck backs down a declined driveway, the top of the truck will engage the shelter prior to the top of the truck. Because the shelters have rigid, inflexible (or relatively inflexible) frames, the sealing effectiveness will be diminished, or a gap may form at the bottom of the shelter. Also, when a truck backs into a dock seal, the same

scenario will occur. To accommodate this situation, dock shelters and seals must be custom-made, including a frame assembly or foam that has a tapered profile (e.g. the frame or foam may protrude farther from the dock wall at the bottom of the shelter or seal than at the top). Further, the fabric material is subject to wear from abrasion during engagement and disengagement of vehicles.

[0004] Accordingly, it is desirable to provide a method and apparatus for sheltering or sealing the area between the dock and vehicle from the environment, which is versatile in that a single unit can be manufactured which accommodates docks having level, inclined, or declined driveways. Further, it would be desirable to provide such an apparatus, which is durable, e.g. is designed to minimize abrasion and wear of the apparatus. It would also be desirable to provide such an apparatus, which can accommodate vehicles of varying widths and heights, as well as vehicles which park off-center in the dock driveway.

SUMMARY OF THE INVENTION

[0005] The foregoing needs are met, to a great extent, by the present invention, wherein in one aspect an apparatus is provided that includes a “self-tapering” feature, the exterior of which may be more durable than some conventional fabric shelters, and which can accommodate vehicles of varying widths and heights, or vehicles which park off-center in the dock driveway. By “self-tapering,” it is meant that a single shelter or seal apparatus can accommodate docks having level, inclined, or declined driveways. The need for custom-made frames or foam to accommodate each of these conditions is therefore alleviated or eliminated. In some embodiments, the “self-tapering” feature is accomplished by using a material which is rigid, but when used in a large structure, is flexible to serve as the frame assembly. That is, the material

from which the dock shelter or seal is made can adjust its shape when a vehicle backs into it on an incline or decline, alleviating or eliminating the need for a custom-made tapered shelter or seal. For example, if a vehicle backs in on a decline, the dock shelter or seal will bow at the top more than at the bottom. Further, unlike many conventional dock shelters, which have a frame assembly and fabric curtains, the frame and fabric curtains can be one in the same in some embodiments of the present invention. In other words, the frame need not be covered by additional fabric material. Also, the frame assembly itself may be made from a material which is durable, resisting abrasion.

[0006] In accordance with one embodiment of the present invention, a panel assembly for mounting along an opening to a dock wall is provided. The panel assembly includes a first and second panel adapted for essentially pivotal movement relative to one another. The first panel can be mounted to the dock wall and is adapted for essentially pivotal movement relative to the dock wall.

[0007] It should be understood, from hereonin, that the term “mountable” or “mounted” is intended to be interchangeable with the phrase “directly or indirectly mountable” and “directly or indirectly mounted.” Thus, for example, specifying that the first panel is mountable or can be mounted to the dock wall means both that it can be directly mounted to the dock wall (e.g. by a hinge mechanism), or else it can be indirectly mounted to the dock wall (e.g. it can be mounted to a frame which is in turn mounted to the dock wall). It should be also understood, from hereonin, that “essentially pivotal movement” includes flexible movement about an axis that may not be purely rotational, as well as rotational movement. For example “essentially pivotal movement” may result from the first panel being mounted to the dock wall by a flexible bracket, or may result from the first panel being mounted to the dock wall by a hinge.

[0008] In some embodiments, the first panel and second panel each have a castellated edge that interlock to form a hinge joint. In some embodiments, the panel assembly includes a hinge assembly that biases the panel assembly to an open position (i.e. to a position in which the first panel and second panel are apart rather than together). In some embodiments the panels are made from blow molded plastics. In some embodiments, the panel assembly also includes a seal portion, which may be an elastomeric portion in the shape of a hook and which engages the back of a truck backing into the loading dock.

[0009] It should be understood that the “seal portion,” also referred to as a “seal member,” need not completely eliminate environmental intrusion. Rather, it is intended that apparatus with seal portions are more effective at reducing or eliminating environmental intrusion than those without seal portions. Similarly, when the words “to seal” is used, or the phrase “sealingly engages” is used, or the like, it is not intended that environmental intrusion is necessarily eliminated. Rather it is intended that environmental intrusion is at least hindered or reduced compared to devices which do not seal.

[0010] In accordance with another embodiment of the present invention, a dock shelter or seal apparatus is provided having at least one panel assembly. The panel assembly includes a first and second panel, wherein the second panel is adapted for pivotal movement about a first axis relative to the first panel, and the first panel is mountable to one vertical side of the dock wall opening. In some embodiments the dock shelter or seal includes a second panel assembly similar to the first panel assembly, but is adapted to be mounted to the opposite vertical side of the dock wall opening. In such embodiments, the combination of the first and second panel assemblies form an expandable dual panel assembly, i.e. the dual panel assembly, in operation, can accommodate trucks of varying widths and/or

which park off-center in the dock driveway. In some embodiments the dock shelter includes first and second panel assemblies as well as a head curtain. The head curtain can be constructed similarly to the side panel assemblies or it can be a conventional head curtain or other head curtain known in the art.

[0011] In accordance with still another embodiment of the present invention, a dock seal apparatus is provided which includes a first expandable panel assembly mountable to the dock wall and is configured to sealingly engage trucks of varying widths. The expandable panel assembly comprises a first panel means, a second panel means, and a sealing member means. The second panel means is operably coupled to the first panel means such that the second panel means deflects toward the dock wall opening when the first expandable panel assembly is engaged by a vehicle backing into the dock. The first panel means is adapted to be operably coupled to the dock wall such that the first expandable panel assembly can accommodate trucks of varying widths. Specifically, when a narrower vehicle backs into the loading dock and engages the first expandable panel assembly, the first panel means deflects inwardly, toward the dock wall opening. On the other hand, when a wider vehicle backs into the loading dock and engages the first expandable panel assembly, the first panel means remains essentially stationary (i.e. remains essentially perpendicular to the dock wall) and may even deflect outwardly, away from the dock wall opening. The sealing member means is either integral with or attached to the second panel means and engages the back of a vehicle backing into the dock.

[0012] In accordance with yet another embodiment of the present invention, a method for sheltering the area between the end of a vehicle parked at a dock and a dock is provided. The method includes installing first and second panel assemblies, wherein the panel assemblies each have a first panel and a

second panel, the second panel is adapted for pivotal movement relative to the first panel. Installation is accomplished by flexibly mounting the first panel to the dock wall. "Flexibly mounting" means, from hereonin, that the mounting structure enables the first panel to deflect toward or away from the dock opening in response to the second panel engaging a vehicle.

[0013] There has thus been outlined, rather broadly, certain embodiments of the invention in order that the detailed description thereof herein may be better understood, and in order that the present contribution to the art may be better appreciated. There are, of course, additional embodiments of the invention that will be described below and which will form the subject matter of the claims appended hereto.

[0014] In this respect, before explaining at least one embodiment of the invention in detail, it is to be understood that the invention is not limited in its application to the details of construction and to the arrangements of the components set forth in the following description or illustrated in the drawings. The invention is capable of embodiments in addition to those described and of being practiced and carried out in various ways. Also, it is to be understood that the phraseology and terminology employed herein, as well as the abstract, are for the purpose of description and should not be regarded as limiting.

[0015] As such, those skilled in the art will appreciate that the conception upon which this disclosure is based may readily be utilized as a basis for the designing of other structures, methods and systems for carrying out the several purposes of the present invention. It is important, therefore, that the claims be regarded as including such equivalent constructions insofar as they do not depart from the spirit and scope of the present invention.

BRIEF DESCRIPTION OF THE DRAWINGS

[0016] FIG. 1 is a perspective view illustrating a combined dock seal and shelter apparatus according to a preferred embodiment of the invention.

[0017] FIG. 2 is a perspective view of a combined dock seal and shelter apparatus according to another preferred embodiment of the invention.

[0018] FIG. 3 is a perspective view of a combined dock seal and shelter apparatus according to another preferred embodiment of the invention.

[0019] FIG. 4 is a top view of a side panel assembly in accordance with one embodiment of the invention.

[0020] FIG. 5 is a top detail view of the seal portion of the panel assembly of FIG. 4 shown engaged to the back of a vehicle parked at a loading dock.

[0021] FIG. 6 illustrates an exemplary corner seal assembly suitable for use with a dock seal or shelter according to the present invention.

[0022] FIG. 7 is a diagrammatic representation of a panel assembly according to an embodiment of the invention engaged with a wide and a narrow vehicle.

[0023] FIG. 8 is a diagrammatic representation of an expandable panel assembly engaged to a vehicle parked off-center in a driveway of a loading dock.

DETAILED DESCRIPTION

[0024] The present invention provides a panel assembly suitable for use in dock shelters and seals, which in some embodiments can accommodate vehicles of varying widths, vehicles parked off-center in the dock driveway, and which can be made from more durable materials than typical dock seals and shelters having fabric covered foam and fabric curtains. In some embodiments, a panel assembly according to the present invention is provided

having two axes of rotation, one within the panel assembly, and one at or near an edge of the panel assembly which will be mounted to the dock wall.

Specifically, the panel assembly has two panels joined at an axis of rotation, and the panel assembly is further adapted to be pivotally mounted to the dock wall. This dual axis of rotation configuration enables the panel assembly to expand and contract to accommodate vehicles of varying widths, and vehicles parked off-center. Further, providing an axis of rotation within the panel assembly enables the panels to be made from more rigid (i.e. more durable) materials than dock shelters which have fabric curtains lacking the inner axis of rotation.

[0025] Although the apparatus described herein is particularly well-suited for use with a loading dock on a warehouse or the like, the teachings of the instant invention are not limited to any particular environment of use; rather, for example, the invention can be employed with virtually any structure adjacent a parking area where the creation of a seal with a vehicle is desired.

[0026] The invention will now be described with reference to the drawing figures, in which like reference numerals refer to like parts throughout. FIG. 1 illustrates a combined dock shelter and seal 10 in accordance with an embodiment of the invention, mounted adjacent to the wall 1 alongside a conventional loading dock opening 2, normally provided in warehouses, truck terminals, manufacturing plants and the like where materials and products are received and/or dispatched by trucks. The dock shelter and seal 10 includes an expandable panel assembly 11 mounted along either vertical side of the dock wall opening 2, a top portion 3 mounted along the top horizontal side of the dock wall opening 2, and optional draft pads 16 located at the base of the structure 10. The top portion 3 in this embodiment is a hood

14, which may be disposed outside the expandable panel assembly 11 as shown in FIG. 1, or it may be disposed inside or above the expandable panel assembly 11. For ease in description, the structure 11, comprising the two structures 12, will be referred to as an expandable panel assembly, whereas structures 12 will be referred to only as panel assemblies. However, it should be understood that panel assemblies 12 are expandable, consistent with the use of that term in this specification, and thus are “expandable panel assemblies”.

[0027] The structure 11 includes two panel assemblies 12. Each panel assembly 12 includes a first panel 18 and a second panel 20 and an optional seal member 22. The optional seal member may contain a serrated area 23 that will deflect easily (i.e., more easily than the seal member 22) so when the roof of a truck contacts the serrated area 23, the serrated area 23 deflects and moves out of the way to allow the seal member 22 to contact the entire length of the side of the truck. The serrated area 23 is positioned along the seal member so it will accommodate trucks of varying heights. The serrated area 23 may be made from cutting slits in the seal member 22 or it may be a brush type seal that is mounted in conjunction with the seal member 22. The panel assemblies 12 can also include ribs (not shown) in different areas of the panels and/or different orientations, as is known in the art, to aid in controlling the rigidity and bending of the panels 18, 20.

[0028] Both the first panel 18 and the second panel 20 are generally equal in length and are preferably sized to extend at least the entire length of the dock opening 2. However, panels 18, 20 may be shorter or longer than the length of the dock opening 2. Moreover, the panels 18, 20 are not necessarily unitary pieces as shown, but may be assembled from smaller panel portions.

Such an embodiment may be preferable if the panels 18, 20 are shipped and assembled together in the field.

[0029] The panels 18, 20 are preferably provided by materials which are rigid, but become somewhat flexible when used in a large structure (i.e., the panels will deflect or deform when certain loads are applied). For example, the panels 18, 20 could be made from polyethylene sheets, which have a very low coefficient of friction. The panels 18, 20 could also be made from materials used in conventional dock seals and shelters. Preferably, the panels 18, 20 are made from more rigid and more durable materials than those used in conventional seals and shelters having fabric curtains and covers. The panels 18, 20 are preferably made by blow molding or rotational molding. However, they could also be made by thermoforming or extrusion processes.

[0030] The second panel 20 is adapted for substantially pivotal movement relative to the first panel 18 about a first axis 24. In the illustrated embodiment, this is accomplished by a hinge joint 26 formed by interlocking the first and second curtain panels 18, 20. Specifically, the second panel 20 has a castellated rear end 28 and the first panel 20 has a complementary castellated front end 30.

[0031] The first panel 18 is adapted to be directly attached to the dock wall 1 or indirectly attached to the dock wall 1, for example by attachment to a frame assembly (not shown). The first panel 18 may be anchored rigidly in place or flexibly by any means known in the art, including by bolts, nuts, washers, nails, screws, and hinges. Preferably, the first panel 18 is flexibly mounted, that is it is adapted for essentially pivotal movement relative to the dock wall 1 so that the expandable panel assembly 11 can expand (i.e. the first panels 18 can deflect away from the dock opening) or contract (i.e. the first

panels 18 can deflect toward the dock opening) to accommodate trucks of varying widths and trucks which park off-center in the dock driveway.

[0032] FIG. 2 illustrates a combined dock shelter and seal 10 with a compressible head pad 15. In this embodiment, the compressible head pad 15 is disposed between both panel assemblies 12. The compressible head pad 15 is preferably made from a polyurethane foam covered with fabric. As a truck backs into the expandable panel assembly 11, the second panel 20 is allowed to deflect towards the dock wall because of the compressible nature of the head pad 15. In order to help prevent the infiltration of rain or outside weather, a top seal 16 is positioned at the top and between both sets of first and second panels 18, 20 of the expandable panel assembly 11. The top seal 16 can be made from fabric or elastomeric material which can expand or contract, or it can be made from a more rigid material such as a polyethylene sheet that can be fastened to the top of one of the panels, 18 or 20 and is allowed to slide on top of the other panel while still maintaining contact with not only the other panel but also the top of the head pad 15. Also, in this embodiment, the sealing member 22 may again contain a serrated area 23 (not shown).

[0033] FIG. 3 illustrates yet another embodiment of a combined dock shelter and seal 10 with a compressible head pad 15. In this embodiment, the compressible head pad 15 is disposed on top and between the panel assemblies 12. As shown in FIG. 3, there is wiper seal 17 that is in slidable contact with the bottom surface of the head pad 15. Since the wiper seal 17 remains in contact with the bottom surface of the head pad, a seal is maintained between the bottom of the head pad 15 and the expandable panel assembly 11.

[0034] FIG. 4 is a detailed top view of the panel assemblies 12 of FIG. 1, shown mounted to a dock wall 1, alongside the opening 2 in the dock wall 1. As discussed above, the illustrated panel assemblies 12 include a first panel 18, a second panel 20, and an optional seal portion 22. The second panel 20 is pivotally connected to the first panel 18 forming the hinge joint 26. In the illustrated embodiment, the hinge joint 26 is formed by interlocking the second panel 20 with the first panel 18, as described above, and by inserting a stay 40 lengthwise, from top to bottom through the panel/panel interface region. Stay 40 is preferably a spring, for example a fiberglass composite spring. In other words, stay 40 provides a torsional spring force such that when the second panel 20 is engaged by a vehicle backing into the dock, the stay provides a counterforce.

[0035] The position of the stay within the hinge area is chosen such that the panel assembly is held in an “open” position, and so the second panel 20 will also project into the path of a vehicle backing into the dock and thereby engage the vehicle. It should be understood that the term “open” means that the interior face (i.e. the side closer to the dock opening) of panels 18, 20 are held in position away from each other rather than next to each other. “Open,” however, does not necessarily mean that the panels 18, 20 form a 180 degree angle. In fact, it is preferable that the second panel 20 is mounted at an approximate right angle to the dock wall and such that the interior face of panels 18, 20 form a smaller angle than 180 degrees such that the second panel 20 is held in a position where a vehicle backing into the loading dock can engage the second panel 20. Because of the torsional spring force that the stay can exert, the panel assembly 12 is biased to the open position when a vehicle backs into the dock and engages the second panel 20.

[0036] The panel 18 panel 20 interface region (or hinge joint region 26) can include a backing member 32. The backing member 32 shown is intended to help seal the panel assembly at the interface region from environmental intrusion. For example, gaps in the panel assembly may be present in the hinge region allowing air to enter and escape.

[0037] Alternatively, the backing member 32 can also be a “spring.” The term “spring” is used broadly to encompass any biasing member. For example, with respect to the backing member, a spring is any device that biases the curtain panels 18, 20 either toward or away from one another. In some embodiments, the spring 32 can hold the panel assembly 12 in an open position and further bias the panel assembly 12 to that open position when a vehicle backing into the dock engages the panel assembly 12.

[0038] In the embodiment shown, the backing member 32 is an elastomer, rubber material, or fabric positioned on the interior face of the panels 18, 20 behind the hinge joint 26. As shown, the backing member 32 is held in place by positioning it between recessed portions 34 of each curtain panel 18, 20 and is caulked in place. The material for the backing member 32 can be, for example a 22 oz. vinyl fabric. However, the backing member 32 can be any other material or device that can operate to seal the curtain assembly at the hinge region. The backing member 32 may run along the entire height of the panel assembly 12, or may run only along a portion of the height of the panel assembly 12. Also, there may be one or more than one backing member 32 in each panel assembly 12.

[0039] Alternatively, the hinge joint 26 itself may not provide any spring force, but instead the backing member 32 may be a spring. For example, the hinge region 26 may be similar to a door hinge mechanism,

preferably with a seal provided in between, and the backing member 32 provides the spring force. In such a case, the backing member (or spring) 32 can be any material that provides a spring force, such as an elastomeric, rubber material, fiberglass composite, or spring steel. As another example, the spring 32 could be triangular foam blocks. As well, both the hinge joint 26 and the backing member 32 could operate as springs.

[0040] The first panel 18 is adapted for essentially pivotal movement relative the dock wall 2 as shown. In the embodiment shown, the first panel 18 is flexibly mounted directly to the dock wall using an L-shaped spring 36. The spring 36 is an elastomer extrusion or rubber material cut to length. The spring 36 could be a fiberglass composite material or could be made from spring steel or the like. The first panel 18, however, could be mounted by other methods as well. For example, the first panel 18 could have a mounting angle thermoformed into it and rely on a base material to provide spring force. Or else, as another example, the first panel 18 could be mounted using a hinge. Preferably, the hinge either itself or in conjunction with a backing member, provide a biasing force. Preferably, the mounting choice and biasing force are chosen so that the panel assemblies, when installed, can cooperate to deflect as necessary to accommodate both 8 foot wide and 8 foot 6 inch wide trucks when parked up to 6" off-center in the dock driveway.

[0041] Although in the illustrated embodiment, panel assemblies 12 are shown mounted directly to the dock wall, the panel assemblies 12 may also be mounted indirectly to the dock wall. For example, the panel assemblies 12 may be mounted to a frame or other structure which in turn is mounted to the dock wall.

[0042] The seal member 22 is shown in detail in FIG. 5, engaged to the back of a vehicle. The seal member 22 is a U-shaped, or hook shaped, assembly comprised of a portion of the edge of the second panel 20, which is formed in a bent shape, in addition to a separate seal strip 38 bolted to the panel 20. The U-shape assists engagement with the back of a vehicle to thereby form a seal. Therefore, it is preferable that the size and shape of the seal member is chosen to engage the interior edge of the truck wall 5, as shown in FIG. 5. Although the embodiment shown is a seal member 22 that includes both a portion integral with the second panel 20 as well as a portion separate but attached to the second panel, the seal member 22 may be completely integral with the second panel 20, or else it may be completely a separate portion from the second panel 20.

[0043] The top portion 3 can be, for example, a conventional hood 14, such as shown in FIG. 1, a compressible head pad 15 positioned either above or inside the panel assemblies, as shown in FIG. 2 and 3 or it can be similar to the panel assembly 12, described above, but configured for mounting horizontally rather than vertically. If the top portion 3 is configured similarly to panel assembly 12, preferably the dock shelter or seal includes a corner seal assembly 42, an example of which is shown in FIG. 6, where the top portion 3 and panel assemblies meet. Thus, as shown in FIG. 6, in some embodiments, the top edge of each panel assembly 12 and each side edge of the top portion 3 are cut at approximately a 45 degree angle, so the edges meet to form a joint like that in a “picture frame.” To alleviate environmental intrusion, which may occur if a vehicle backing into the dock causes the edge of the panel assembly 12 and top portion 3 to move apart, a corner seal assembly 42 is provided. The illustrated corner seal assembly 42 includes a flexible material

portion 44, a stiff body portion 46, and an elastomeric or fabric seal 48 on either edge of the stiff body portion 46. The flexible material portion 44 is mounted at or near the corner of the dock shelter and is attached to the stiff body portion 46. The stiff body portion 46 “floats” on the dock shelter 10 and is not attached (other than via the flexible material) to the dock shelter. This design should enable the corner seal to alleviate environmental intrusion even when the interface between the head curtain and side curtain assembly opens asymmetrically.

[0044] FIG. 7 illustrates the operation of a panel assembly 12 when engaging both a narrow (e.g. 8 foot wide) truck, and a wide (e.g. 8 foot 6 inch wide) truck. As is shown, the back of the truck engages the second panel 20. Specifically, the seal member 22 wraps around the back edge of the truck. As the truck backs up, the second panel 20 and first panel 18 rotate or flex as needed to stay engaged with the truck and form a seal. As is shown, in the case of a narrow truck, the first panel 18 flexes inwardly (i.e. toward the dock opening) to a greater degree than in the case of a wide truck backing into the dock. By contrast, the second panel 20 flexes inwardly to a greater degree in the case of a wide truck than a narrow truck.

[0045] FIG. 8 illustrates operation of the expandable panel assembly 11 when a truck backs into the dock but is off-center in the driveway. As the diagram indicates, embodiments according to the present invention allow each panel assembly 12 to independently react to engagement with the truck. Thus, on the side where the truck is further from panel assembly 12, the panel assembly 12 operates similarly to when a narrower truck backed into the driveway. And, on the side where the truck is closer to the panel assembly 12,

the panel assembly 12 operates similarly to the case where a wide truck backs into the driveway.

[0046] The many features and advantages of the invention are apparent from the detailed specification, and thus, it is intended by the appended claims to cover all such features and advantages of the invention which fall within the true spirit and scope of the invention. Further, since numerous modifications and variations will readily occur to those skilled in the art, it is not desired to limit the invention to the exact construction and operation illustrated and described, and accordingly, all suitable modifications and equivalents may be resorted to, falling within the scope of the invention.